vidual adapts to an environment ('social heredity') because of what he is congenitally. In the language of evolutionists this is survival of the fittest or natural selection, though Prof. Baldwin seems to think he has introduced a new factor in his 'social heredity.' The name is new and to my mind objectionable, as there is no real heredity; the idea is not.

Ordinary people express themselves by saying that we become what we are because of 'education,' 'circumstances,' etc. We say, "The man is the product of his age."

People tend to believe too much in the power of education, circumstances, etc., and too little in heredity; hence all sorts of cures for deep-rooted evils are ever welcome. But we find that the changes wrought by 'social heredity' are very much on the surface, and in consequence there may be but little outcome from these effects, possibly none in some cases, in heredity, as ordinarily understood, which does not, however, contravene the Lamarckian or any other well recognized principle of heredity or evolution. To return to the concrete: A and B have offspring, differing slightly from themselves. The 'social heredity' has had little effect, therefore, on the race; in the case of the lower animals, much less than in the case of man, possibly, and if the offspring C and D be placed in widely different environments the slight extent to which they have varied (congenitally) will be all the more evident.

A Lamarckian explains these variations, such as they may be, by the influence of the use and disuse of parts, and evolutionists of other schools in other ways. Prof. Baldwin misapprehends, I take it, the sense in which I employed the term 'use' in the phrase which he quotes from my last letter. The Lamarckian sense was that intended.

I must repeat that, after reading a good deal of what Prof. Baldwin has written on this aspect of evolution, it still seems to me that while he has with new terminology set forth old views in a new dress that there is really no new principle or factor involved. I do not, of course, consider such writing without special value, though it may sometimes be provokingly difficult to understand from the new technicalities employed, for the relative parts played by heredity and environment in the make-up of each individual is an interesting and practically very important problem.

If I have failed to understand Prof. Baldwin fully and so to appreciate his views at their full value on the score of originality, I regret it. However, it is likely that others are in the same case, and I venture to suggest that the remedy for our denseness, if such it be, is to be found in a specific and concrete treatment of the subject.

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NOTES ON PERCEPTION OF DISTANCE.

IT appears to me that the best *data* for determining the psychological elements in the perception of distance, as I suggested some time since in SCIENCE *apropos* of mountain climbers, is to be derived from those men of mature and reflective mind who, finding themselves in very strange surroundings, are compelled to learn a new language of distance. From them we can obtain direct evidence of what passed in their consciousness, an evidence thus far superior in value to the indirect judging from the action of infants or young animals, or even the meager and few reports of the blind who have suddenly received sight. Even supposing a blind genius for psychological analysis to be suddenly given sight, the fact that an absolutely novel and complex experience was produced which included much else than mere perception of distance, as light, color, form, would tend to make his evidence to some extent unsatisfactory. For the best results in the study of perception of distance we must then find it in course of formation with individuals sufficiently educated and reflective to give some account of their experience. Even then the forming perception may be so instinctive a process that the elements may not be clearly discernible. For instance, Mr. Casper Whitney in the strange surroundings of the Barren Grounds had to learn a new form of distance which he thus describes in *Harper's Magazine* for April, 1896, (p. 724): "I began my first lessons in Barren Ground distance-gauging by guessing the yards to a stone and then pacing them off. I was not only astonished at the discrepancy between

my guess and the actual distance, but oftentimes by the size of the rock when I reached it. A stone which looked as large as a cabin at four or five hundred yards would turn out to be about as big as a bushel basket. I found much difficulty in overcoming the tendency to exaggerate distance, though the Indians apparently were not so troubled." In response to my inquiry, he further writes: "When I got so I could judge the distance with comparative accuracy, it was simply that I had to accommodate myself to the new (to me) size of rocks at those distances." From which it is plain that the newly determined distance by pacing did not alter the apparent size of rock, the apparent size is simply interpreted for a new distance value. He says to himself, "that appearance means not as I might before have judged, but so much more or less distance." In other words there is here no judging from sense of accommodation or muscular sense of any kind, because that is unaltered, the image of the thing seen being constant as to size and appearance. Distance for Mr. Whitney seems to be purely a judgment, more or less revised by actual pacings, of fixed visual appearances.

Another point on the perception of distance was suggested by James (Psychology, II., 213): "I cannot help thinking that anyone who can explain the exaggeration of the depth sensation in this case (inverted vision) will at the same time throw much light on its normal constitution." This suggests whether bats which habitually hang head downwards would not have distance lengthened by erect vision. I do not know whether this could be tested by bringing certain foods to the attention of such animals at varying distances for inverted and erect vision. I found by some simple experiments upon myself and also upon a friend that lying down, with the head in horizontal position, distance was shortened, but I was not able to test at what angle toward inverted vision distance first began to lengthen. If not already tried, it might be useful for some of our psychological laboratories to set up a tackle, so that a person might be revolved through the whole circle, and the effect on perception of distance noted at all angles. It would also be well to test whether inverting the object looked at disturbed the sense of distance. I got no result in this matter by looking at objects at the end of a long hall.

HIRAM M. STANLEY.

LAKE FOREST, ILL., April 27.

THE MAMMOTH BED AT MOREA, PA.

TO THE EDITOR OF SCIENCE: The following interesting section was found on the glaciated outcrop of the Mammoth (E) bed at Morea, Pa., within one mile of the farthest southern limit of glaciation, and from 20 to 25 miles south of the moraine of Lewis and Wright. The measures are nearly vertical and form a narrow and deep basin. A section taken on the bed gave:

(a) Till of sandy, clayey nature, with burden of Pottsville conglomerate and varying sandstones, and with irregular lenticular patches of clean reddish clay of small extent. The solid burden is angular and sub-angular, and not polished nor striated. In some cases boulders 5 feet thick occur. Total thickness, 6 to 10 feet.

(b) Crushed anthracite, bright and firm, shipped to market. This is readily scraped up with the fingers. In places to the north hundreds of tons of this crushed coal have been sold. When we realize that this is under a sandy till we can estimate the comparative recency of glaciation. In some places this layer will reach 18 inches in thickness.

(c) Rotten anthracite with angular specks of firm slate from coal. Thickness $\frac{3}{4}$ inches.

(d) Sandy clay, usually grayish, but sometimes clear red or yellow. It bears rolled and angular quartz and slate pebbles, pieces of anthracite, but little anthracite dust. Thickness 1 inch.

(e) Crushed anthracite, firm and bright, like (b). Thickness $\frac{1}{4}$ to $\frac{3}{4}$ inches.

(f) The glaciated surface of the outcrop of the bed. Soft and fully rotted so as to be dull, like black chalk, and easily cut by the fingernail. Thickness $\frac{3}{5}$ of an inch.

(g) Solid and bright anthracite of the bed.

On comparing unglaciated or protected outcrops we find (f) measuring many feet in depth. We find here that the amount of decomposition of solid coal since glaciation is $\frac{3}{5}$ of an inch.

The presence of the layer (d) is peculiar between two layers of crushed anthracite which are bright and fresh.